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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,286	02/16/2006	Takashi Fukuda	040302-0547	3477

22428 7590 07/17/2007
FOLEY AND LARDNER LLP
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER	
ONEILL, KARIE AMBER	
ART UNIT	**PAPER NUMBER**
1745	

MAIL DATE	DELIVERY MODE
07/17/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/568,286	FUKUDA, TAKASHI	
	Examiner	Art Unit	
	Karie O'Neill	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The Applicant's amendment filed on April 17, 2007, was received. Claims 1-8 were amended.

Claim Rejections - 35 USC § 112

2. The Claim rejections under 35 U.S.C. 112, second paragraph, with regard to Claims 1-8 are withdrawn, because the independent Claim 1 and the dependent claims have been amended.

Claim Rejections - 35 USC § 102

3. The Claim rejections under 35 U.S.C. 102(b), with regard to Claim 1 is withdrawn, because the independent Claim 1 has been amended.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akahori (JP 2003-115314) in view of Nonobe et al. (US 2002/0094467 A1).

With regard to Claims 1, Akahori discloses a fuel cell system comprising: a fuel cell stack (201) to be supplied with gas for power generation, the unused gas to be discharged out of the fuel cell (paragraph 0028); a circulation flow path through which

the gas discharged out of the fuel cell through an ejector (208) is resupplied to the fuel cell (paragraph 0028); a discharge valve (206) for discharging the gas in a circulation flow path; a voltage sensor (215) for measuring voltage of the fuel cell; and a controller (214) for controlling the discharge valve (206), wherein the valve is controlled based on the voltage measured by the voltage sensor (paragraph 0028). Akahori does not disclose a variable flow rate circulation pump for circulating gas through the circulation flow path, which is operative to adjust a flow rate of the gas in the circulation path and a controller for controlling the variable flow rate pump.

Nonobe et al. disclose in Figure 1, a fuel cell (100), a circulation path (403), a valve (414) for discharging the gas in the circulation path to the outside of the circulation flow path, a variable flow rate circulation pump (410) for circulating gas through the circulation flow path, and a controller (50) for controlling operation of the circulation pump (410) so that the flow rate or speed of the hydrogen gas through the circulation path (403) varies depending upon an amount of consumption of the electric power generated by the fuel cell (paragraph 0046). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use a variable flow rate circulation pump in the fuel cell system of Akahori, because Nonobe et al. teach varying the flow rate of the pump in order to be able to deliver the correct amount of recirculated hydrogen off-gas back to the fuel cell in order to maintain normal operating conditions and to avoid the hydrogen off-gas being too wet or containing too many impurities (paragraphs 0046-0048).

With regard to Claims 2 and 3, Akahori discloses the fuel cell system comprising a plurality of fuel cells stacked on one another (201) and the voltage sensor (215) measures voltages of the respective cells (paragraph 0028), and wherein if some of the measured voltages of the respective cells are within a predetermined range, the discharge valve is controlled to increase an amount of gas to be discharged, as the value of the voltages of the respective cells becomes lower. As the variation in the measured voltages between the cells becomes smaller (V1<V2, the indication of a short circuit), the purge valve is opened, increasing the cell discharge rate (paragraphs 31-34). Akahori does not disclose wherein the circulation pump is controlled to reduce a flow rate of the gas circulated as the voltages of the respective cells becomes lower.

Nonobe et al. disclose a controller (50) for controlling operation of the circulation pump (410) so that the flow rate or speed of the hydrogen gas through the circulation path (403) varies depending upon an amount of consumption of the electric power generated by the fuel cell (paragraph 0046). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to control the circulation pump to reduce a flow rate of gas circulated in the fuel cell system of Akahori, because Nonobe et al. teach trying to avoid the accumulation of impurities in the circulation flow path by varying the amount of hydrogen being passed through in order to avoid a reduction in the output voltage of the fuel cell (paragraph 0045).

With regard to Claims 4-6, Akahori disclose the fuel cell system comprising a plurality of fuel cells stacked on one another (201) and the voltage sensor (215) measures voltages of the respective cells (paragraph 0028) wherein the monitored

voltages are within a predetermined range that when functioning normally is V1<V2 (paragraph 0031); the fuel cell system further comprises a clogging detector comprised of the voltage sensor (215) in combination with the controller (214), wherein the clogging detector monitors the voltages of the respective cells and determines possibility of clogging of a gas passage in the fuel cell based on the monitored voltages of the respective cells. Akahori do not disclose wherein the circulation pump is controlled to reduce a flow rate of the gas circulated, and the discharge valve is controlled to increase an amount of gas to be discharged, as the possibility of clogging is determined to be low.

Nonobe et al. disclose a controller (50) for controlling operation of the circulation pump (410) so that the flow rate or speed of the hydrogen gas through the circulation path (403) varies depending upon an amount of consumption of the electric power generated by the fuel cell (paragraph 0046). Nonobe et al. also disclose, if the hydrogen off-gas is returned to the fuel cell (100) via the pump (410), the moisture or water contained in the hydrogen off-gas is not vaporized sufficiently, and, as a result, the moisture supplied to the fuel cell may adhere to the walls in the unit cells of the fuel cell stack, possibly resulting in clogging of hydrogen-gas channels in the fuel cell. If the channels are clogged, output voltage of the unit fuel cells of the fuel cell stack is reduced, resulting in a reduction in electric power generated by the fuel cell as a whole (paragraph 0048). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to reduce a flow rate of the gas circulated as the possibility of clogging the fuel cell system of Akahori is determined to be low, because Nonobe et

al. teach the circulation pump (410) being variably controlled by the controller (50) so that the flow rate of the hydrogen gas through the circulation passage (403) depends on the consumption of the electric power generated by the fuel cell and when the circulation path is not clogged, less impurities are present and less hydrogen needs to flow through the paths to push out the impurities (paragraphs 0045-0048).

With regard to Claim 8, Akahori discloses a fuel cell system comprising: a fuel cell stack (201) to be supplied with gas for power generation, the unused gas to be discharged out of the fuel cell (paragraph 0028); a circulation flow path through which the gas discharged out of the fuel cell through an ejector (208) is resupplied to the fuel cell (paragraph 0028); a discharge valve (206) for discharging the gas in a circulation flow path; a voltage sensor (215) for measuring voltage of the fuel cell; and a controller (214) for controlling the discharge valve (206), wherein the valve is controlled based on the voltage measured by the voltage sensor (paragraph 0028). Akahori does not disclose a variable flow rate circulation pump for circulating gas through the circulation flow path, which is operative to adjust a flow rate of the gas in the circulation path, a controller for controlling the variable flow rate pump and discharging the fuel gas out of the circulation system if the monitored voltage output is within a predetermined range and an average value of the output voltage is lower than a predetermined value.

Nonobe et al. disclose in Figure 1, a fuel cell (100), a circulation path (403), a valve (414) for discharging the gas in the circulation path to the outside of the circulation flow path, a variable flow rate circulation pump (410) for circulating gas through the circulation flow path, and a controller (50) for controlling operation of the circulation

pump (410) so that the flow rate or speed of the hydrogen gas through the circulation path (403) varies depending upon an amount of consumption of the electric power generated by the fuel cell (paragraph 0046). Nonobe et al. also disclose an equal amount of hydrogen is supplied to each of the hydrogen electrodes in the fuel cell, whereby an open-end voltage of the fuel cell can be set at a predetermined level and a controller (50) opens valve (414) to gradually discharge the circulating hydrogen off-gas (paragraph 0097). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use a variable flow rate circulation pump in the fuel cell system of Akahori, because Nonobe et al. teach varying the flow rate of the pump in order to be able to deliver the correct amount of recirculated hydrogen off-gas back to the fuel cell in order to maintain normal operating conditions and to avoid the hydrogen off-gas being too wet or containing too many impurities (paragraphs 0046-0048).

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akahori (JP 2003-115314) in view of Nonobe et al. (US 2002/0094467 A1), as applied to Claims 1-6 and 8 above, and in further view of Barton et al. (US 6,960,401 B2).

Akahori and Nonobe et al. disclose the fuel cell system in paragraph 5 above, but do not disclose wherein the valve is controlled to increase an amount of gas to ve discharged if a rate of increase is in the measured voltage is kept below a predetermined rate while, the circulation pump is being controlled to increase a flow rate of the gas circulated more than that in a normal operation.

Barton et al. disclose a fuel cell purging method and apparatus in which a significant drop in the voltage across one or more of the fuel cells requires a purge valve to open (column 12 lines 1-10). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to modify Akahori and Nonobe et al. to include a purge activation if the rate of increase in the measured voltage is low such as taught by Barton et al. in order to discharge fuel from the fuel cell as a result of abnormal operation. It would have also been obvious to one having ordinary skill in the art at the time of the invention was made to increase the circulated flow gas to a value above normal operation in order to force the fuel inside the fuel cell to flow out of the discharge valve as a result of the pressure increase in the circulation line.

Response to Arguments

7. Applicant's arguments, see pages 6-8, filed April 17, 2007, with respect to the rejection(s) of claim(s) 1 under 35 U.S.C. 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of a new combination of references.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karie O'Neill whose telephone number is (571) 272-8614. The examiner can normally be reached on Monday through Friday from 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Karie O'Neill
Examiner
Art Unit 1745

KAO

DAH-WEI YUAN
PRIMARY EXAMINER